DID YOU KNOW?

GENERAL SAFETY RECOMMENDATIONS FOR POWER CAPACITORS (ZVEI EXTRACT)

I. Scope

These safety recommendations and requirements apply to the following power capacitors and standards. Their purpose is to describe the state of technology which must as a rule be adhered to in all relevant contracts for goods and services.

Power capacitors for power factor correction (PFC) up to 1000 V	IEC / DIN EN 60831 and 60931
Power capacitors for power factor correction (PFC) above 1000 V	IEC / DIN EN 60871
Power capacitors for induction heating installations (PFC)	IEC / DIN EN 60110
Capacitors for power electronics (PEC)	IEC / DIN EN 61071
Capacitors for railway applications (PEC)	IEC / DIN EN 61881
Lighting capacitors (AC)	IEC / DIN EN 61048/49
Motor capacitors (AC)	IEC / DIN EN 60252
Surge capacitors	DIN VDE / 0560-3 (currently no IEC rule available)

II. General safety rules

Since power capacitors are electrical energy storage devices, they must always be handled with caution. Even after being turned off for a relatively long period of time, they can still be charged with potentially lethal high voltages. The same applies to all system components and devices which have an electrically conductive connection to the capacitor. The general rules of good electrical engineering practice must always be complied with when handling live components in electrical systems.

V. Risk Factors for the capacitor

The most frequent risk factors which cause capacitor damage and possibly also the failure of the internal protective devices are:

1. Exceeding the permissible temperature on the capacitor surface (every increase in operating temperature of 7 K cuts life expectancy in half).
2. Overvoltages, overcurrents and high inrush currents even if they only occur briefly or cyclically (a continuous increase in the operating voltage of the capacitor of 8 % cuts life expectancy in half).
3. Network harmonics, resonances created by harmonics or flicker even when they occur only briefly or cyclically.
4. Aging of the lighting equipment and consequential excess temperature or high UV stress.
5. Failure of other components in a common circuit and consequential overvoltages or overcurrents.
6. Interaction with other reactive power components, and also parasitic capacitances (cable) or inductivities in common circuits.
7. Even if the test based on the capacitor standard is passed, this does not ensure comprehensive protection against all possible overloading.
8. During the operation of thyristor-switched capacitor systems, high DC voltages can occur continuously on the capacitors of compensation systems which are not switched on. These DC voltages must be considered when designing the capacitors and their discharge devices.

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